Statistical training in humanities and social sciences in group and at distance: exploration of the effects of teaching and learning on collaborative work through the observable traces of social interactions in a system of on-line distance education

Jean-Claude Regnier, Annick Pradeau, Muhammad Shahid Farooq

STATISTICAL TRAINING IN HUMANITIES AND SOCIAL SCIENCES IN GROUP AND AT DISTANCE:

Exploration of the effects of teaching and learning based on collaborative work through the observable traces of social interactions in a system of online distance education

Jean-Claude Régnier*, Annick Pradeau and Muhammad Shahid Farooq***
*UMR 5191 ICAR - Université de Lyon - Lyon2, France
**Université de Rouen, France
jean-claude.regnier@univ-lyon2.fr

Abstract

This paper focuses on the organization and content of social interactions within a group of students engaged in a learning situation focusing on concepts of Statistics. The importance of social interactions in the teaching and learning is largely developed by socio-constructivist theories. We intended to look at the micro-level exchanges between students engaged in a complex task oriented teaching. Technical constraints and spatio-temporal characteristics influence on actors who act for the social organization established to achieve the common goal. This observation was achieved through a quantitative and qualitative analysis of messages exchanged in a discussion forum dedicated to learners. Learning Statistics at distance education and in an online group situation are a new framework of experience. 'What occurs' when a group of students learns Statistics without direct meetings, among themselves and with the teacher was the main question of the study.

Key Words: *Statistical training, social interaction in online teaching, learning statistics at distance, online statistics learning, learning statistical concepts and ICT.*

INTRODUCTION

The rapidly increasing trends for use of Information Communication Technologies in teaching at higher education level have replaced the traditional means of exchange of information with novel learning environments. Like other different fields of life, internet has affected the field of teaching and learning a lot. This vast territory of knowledge provides an easy and quick access to the users around the globe. It not only minimizes the geographical distances but also provides virtual platform for collaboration and learning (Levy, 1997; Quéau, 2000). It facilitates the linking of individuals or groups separated geographically. This new development has not only affected the educational world but also the social interactions of the learners (Pradeau, 2009). Training institutions become able to extend their services to this new space by offering online distance learning courses (Wallet, 2007). Technical progress is accompanied by a change in social practices, especially with the proliferation of social networks. The use of the internet has driven media and practices from static pages to dynamic pages, where the concept of interaction makes sense. It is no longer a mere spectator but it became an actor, interacting with other users and exchanging all kinds of data (Wolton, 2000).

The importance of social dimension in a learning context is a prehistoric concept, developed largely by socio-constructivist theories. Thus the work done in the years 1970s and 80s, on the concept of socio-cognitive conflict (Perret-Clermont, 1986) highlighted the social dimension of development of intelligence and the role of interactions in individual's cognitive development. Goffman (1988) defined the basic social interaction as "any occasion when an individual comes forward for responding to another, whether by physical co-presence, by telephonic call or by exchange of letters". This

definition confirms the sense that he gives to social contact, it binds primarily to the possible response of the other, and nuance the idea of a necessary physical co-presence. It establishes the connection between the "micro" and "macro" postulating that the study of interactions among a small group can grasp society as a whole (Winkin, 2001). Goffman (1973) focused on the team concept which he defined as a set of people whose very close cooperation is essential for maintaining and explaining the situation. An interdependent relationship is created among its members, to trust each other as to their conduct for the maintenance of the interactional order. The commitment of each team member can maintain a certain intellectual and emotional attention towards mobilization of psychological resources for the purpose of official interaction (Nizet & Rigaux, 2005).

Technical progress is accompanied by a change in social practices, especially with the proliferation of social networks. The social practices of the students are gradually modified by this digital media. The units like place, time, action that characterize the classroom in the traditional education is disrupted and lead to a need to redefine the educational area and its educational components (Glikman, 2002). Learners located in different geographical locations, can gather to study together on the same virtual space as a forum for discussion which is a technical place for social interaction characterized by written and structured communication (Mangenot, 2008).

Despite the proliferation of videos and pictures on the Web, the text written in natural language remains a central concern in the digital campus, as in the entire education sector. The technical possibility to interact is not sufficient for an efficient learning process. The structure and quality of operation determines the track of the process as well as taking into account the educational part. Indeed, these online collaborative practices are quite different from those experienced in face-to-face, requiring adaptation on the part of individual actors. Working and learning in groups involves mobilizing a number of social skills needed to advance the achievement of the task and / or likely to grow throughout the collaborative situation (Simeone, Eneau & Rinck*.,* 2007). The major aspect of this mode of communication is written, that confines the indices of socio-emotional behavior (sight, posture, voice ...) present in the face-to-face relationship. The written information, often condensed, can be cold and should be "humanely warmed" (Tholozan, 2004). The use of specific codes, such as emoticons (*Smileys*) or writing in capital to strengthen the connection, can give the message to its emotional tone, thus facilitating the interpretation of the text sent. In this mode of communication adds a special dimension of time since much work is done on discussion forums or e-mail, which is an asynchronous mode of communication. The messages are recorded in digital format and can be replayed later. They are like a memory of the group of learners, available at any time.

Traditional teaching involves the physical presence of co-actors: teachers and learners in the same place. In online training, the physical proximity may be absent, or occur in a timely manner, when consolidation in the local university. This part of the experience changes the perception of the other in the interaction. The concept of sense of presence perceived differently in different individuals, stressing that "the physical presence is *a* dimensions of presence and there is a range of presences that range from total absence to co-presence" (Jacquinot-Delaunay, 2001). The concept of distance, very subjective, is primarily a mental construct, a feeling, probably on a different note, but the same order as the presence. The distance learner's primary characteristic of study and the distance is a particular method in this context for learning for

some students and possibly an additional difficulty to pursue a degree (Béziat and Wallet, 2007). Becoming visible and audible at a distance is a way to incarnate in the cyberspace. The remote interaction therefore requires multiplying the various means of conveying the signs of the presence (Weissberg, 2001). This enhanced sense of presence is probably necessary to overcome the interactive solitudes and perhaps limit the number of dropouts especially important in devices for distance learning (Wolton, 2000).

The interest in the issue of social organization, particularly in the context of distance and online university education led researchers to explore the modes of relationships among students working in groups as part of a course, Quantitative, Qualitative Research Methods and Statistics at Master degree level in Education at digital campus, with the ultimate aim of learning statistical concepts and techniques. The main objectives of this study were to explore that how this small social unit is shaped and how it progresses without immediate physical co-presence of participants with an intention of learning statistics? It was started with the assumption that interactions are rich and structured; the technical and spatio-temporal constraints have effects on social practices. The teaching situation that was taken as the basis for observation was being proposed by the teacher in charge of this course. More generally it can be said that the question of working in groups to learn statistics was updated by the proliferation of virtual learning spaces. This approach led to the micro level that is between the microscopic and mesoscopic can pay attention to what happens at a small social unit in the specific context of online collaborative learning. The study of social dimensions into the teaching-learning situations is instrumented to develop as they permeate the whole training process.

METHOD AND PROCEDURE

The methodological choice was to conduct a naturalistic observation of recorded messages on a forum dedicated to a group of students involved in collaborative work for their training and assessment. Data were extracted from written communications among Mater level students enrolled at the campus FORSE (Formations et Ressources en Sciences de l'Education) of University of Lyon, Lyon2-France, by using the digital platform provided to them for Course "Quantitative, Qualitative Research Methods and Statistics". All the students of this course were simply divided into eight sub groups. Each sub group comprised of six students. For this study a group was randomly selected from students of Master of Education, session 2006-07. A manual, explaining the goals and intended outcomes of this course, was communicated and discussed with students in the first meeting by the tutor of this course. The main objective of this course was to complete the methodology training particularly acquired at License Level in the domain of Research Methods and Statistics. To achieve this objective, a situation was proposed around a global common theme, "Academic success: Reasons to implement tools and methods discussed in this course". This theme was broken down into four sub-themes: Academic achievement and family environment, Gender, Team teaching and Social classes. The tasks were listed both at the individual and collective level. This work was to be evaluated and integrated into the overall assessment for obtaining the degree of Master in Education.

In this study a multifaceted methodological approach was adopted: *Deductive inquiry*, for scrutinizing the structured and ritualized online interactions; *Inductive reasoning*, for giving meaning to what emerges from data in the light of inter-actionist concepts. Yet on the other hand, *Abductive approach* was employed to reach a wider conclusion *i.e* a kind of *creative intuition* or

creative insight that facilitates to explain certain phenomenon which is found surprising (Peirce, 2006). In the researches on ICT, the inductive approach is primarily used for the observations of participants' practices and actions performed during the training (Wallet, 2002). The studies on digital forums have the advantage that the data are extracted from the written evidences left over on the platform without disrupting the participants of the forum. These traces of communication are helpful for researchers in understanding the interactions of the group members and their facilitators for better learning (Bruillard, 2005, 2008).

The recorded messages on discussion forum indicating a written evidence of social interactions without physical co-presence of students were examined. This type of data allowed an approximation of data by observation and content analysis (Blanchet, Gione, Massonnat, & Trognon, 2000). This form of observation eradicated the affects induced by the presence of the observers on the observed situation. From another point of view, the files carrying the traces of exchanges via digital connections were documents which were analyzed by the techniques of documentary analysis. The corpus built and analyzed consists of messages exchanged by six group members participating in collaborative work within the selected course. The anonymity and encryption of data were made by assigning the names of fictitious interactants whose initials correspond to coding A, B, C, D, E, F for six students working together. The messages received on the forum were also coded as "Mn" where n is the number of messages on the forum. In order to identify the meaning of the message content, and to assess from the evolutionary aspect, an observation was conducted on three periods that were categorized by thematic unit (Bardin, 2007). Each observation took place over a period of eight days in the beginning, middle and end of the session (sub-corpus P1, P2 and P3). Each sub-corpus, the corresponding coding units of meaning has been presented in a matrix of raw data to reveal the presence or absence of an element in a descriptive and comparative way.

RESULTS

The collaborative work session took place over a period of six and half months (199 days) from September to April. The careful observation of data helped to make the following observations.

The data was consisted of three hundred thirty nine messages, eight of which were filed by three students (*i.e.* G, H & I) from outside the study group. In most cases, the action of filing a message triggers another action on the same model, namely the issue of a new message. Of the 339 forum posts, 259 were messages and answers more than three-quarters (76% of the initial corpus). The messages do not always answers to the first message, but may be a response to another reply message. Several different discussions can take place simultaneously, which is not possible in face-to-face. A discussion was made of at least two messages. The modal value was sixteen messages, with an average of six posts per thread on the whole session. A schematic presentation of communication showed generally linear form of discussions (Figure 1). The messages discussed are represented chronologically from left to right. For example, in discussion 1 (D1), *A is* replied by *D*.

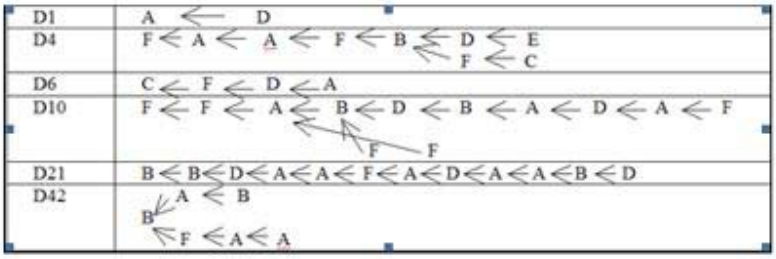

Figure 1: Schematic presentation of interactions

The discussion originated messages and responses to those messages that followed it were recorded during the session.

Table 1

Number of messages submitted by students

Students	A	B	C	D	E	F	G	H	I
Number of messages	114	66	11	47	46	47	5	2	1

The number of messages submitted by each student group's work reveals a wide disparity (Table 1). Out of three hundred thirty-nine messages, one hundred ten contained an attachment which is almost one third of the whole data. These attachments were essentially the files which contain data related to collaborative work. By sharing these files, group members can share their documents, discoveries, questions and advanced work. This technological possibility is not without impact on the learning process by contributing to the rapid exchange of knowledge.

A significant variation exists regarding the size of messages. Shortest includes a single word "here", along with an attachment. The longer includes 626 words, which is considerable. It is a message deposited by a student after a long absence it seems offset by greater participation focused on a single message, which could be considered an exchange repairer. In face-to-face, this action would be considered a monopoly of speech, which does not seem the case here, even if the rule used in the context of a forum is rather concise. This facility of transmission of digitized documents was emphasized in a context of collective work. This technological possibility was not without relevance to the learning process by contributing to the rapid exchange of knowledge.

There were visible actions like filing messages, respond to messages and file attachments which highlights the spatio-temporal aspect of the process. The evidences of these actions were observable at any time and stored as constituting the corpus analyzed. There were also actions not visible, but were mentioned in the message content, such as references to external actions *(e.g* to call, to find information, to be online for a chat). The structure of messages and discussions was very significant: some messages remained unanswered; some were very structured which engaged the male participants. The number of visible interactions varied widely during the session, with periods of intense activity (mid-October and mid-January) where all available actions on the forum were simultaneously involved. The messages were sent prior to all group members. Otherwise, the sender specifies the recipient, either in the introductory part or in the body of message. The message content was very diverse with greetings, exchange of knowledge on the course content or information (technical, organizational ...), references to external events (chats, phone calls, personal life ....) with emotional aspects in particular emoticons which can give messages of significant emotional tones. Each thread was part of a unit of time defined by the publication

dates of the first and last message. The time of interactions can be very long, unlike an exchange face-to-face takes place in the immediate time. A thread can take a few minutes or several days. The modal value was 16 days, and extreme variability was found over the months. The average on the whole session was 4 days per discussion. For a period of one month (Between November 7 and December 6), no message was deposited on the forum.

The purpose of the message originator of the first discussion indicates *"Here"* as an attempt to define a common workplace in space totally intangible digital campus. These references to areas outside the study forum, place chat or telephone appointments (either synchronous interaction) are consistent in the first two corpora (one message in three P1, one message in five P2, none in P3). The third corpus is less significant because it represents the final phase of the session, where the multiplication of communication appears less necessary in terms of work performed. This diversity of places of exchange suggests that interactions between students are not restricted to visible actions on the forum.

The content analysis of messages in three phases of collaborative work shows a strong variation on the present socio-emotional elements, present in 70% of messages early in the session and then declined consistently (Figure 2).

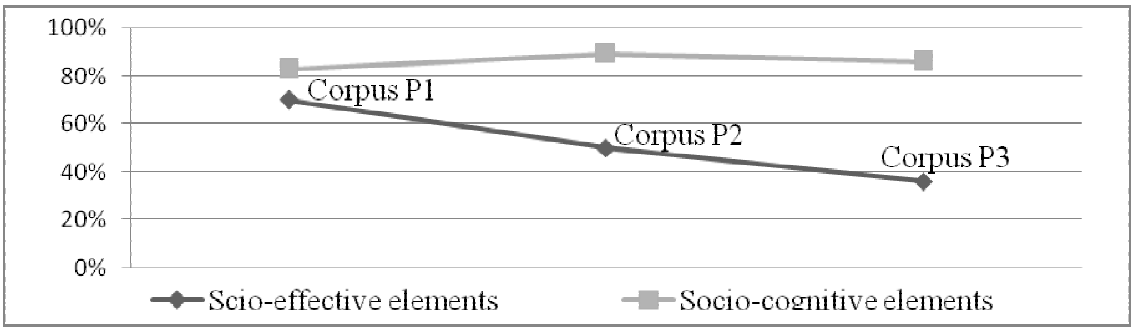

Figure 2: Advancement in content of the messages

The units of meaning to socio-cognitive connotations are found in 83% of messages in corpus P1 with a small growing change in P2 and P3. This high rate of socio-cognitive elements during the whole session is to be directly linked to notions of collaborative work and on line learning. Indeed, the task to be performed, which is at a more distance, requires multiple interactions in terms of building knowledge and methodological organization. The socio-emotional elements, present in very early discourse, probably constitute unity in the working group. These exchanges, which fall faster trademarks of familiarity, contribute to group cohesion, the formation of the team and thereby facilitating the conduct of the task.

In further observation, a distribution of units of meaning to socio-cognitive characteristics in the messages was obtained (Figure 3). Exchanges showing meaning of units concerning the organization of collaborative work are the most representative and remain almost constant during the module. The realization of a complex group and at a distance requires strong coordination throughout the process. The graph of meaning units referring to the concept of sharing is strongly upward. Students share their findings or issues, fueling the process of learning both individually and collectively. This situation seems to have attributes conducive to the attainment of Socio-cognitive conflict in nature (Perret-Clermont, 1986).

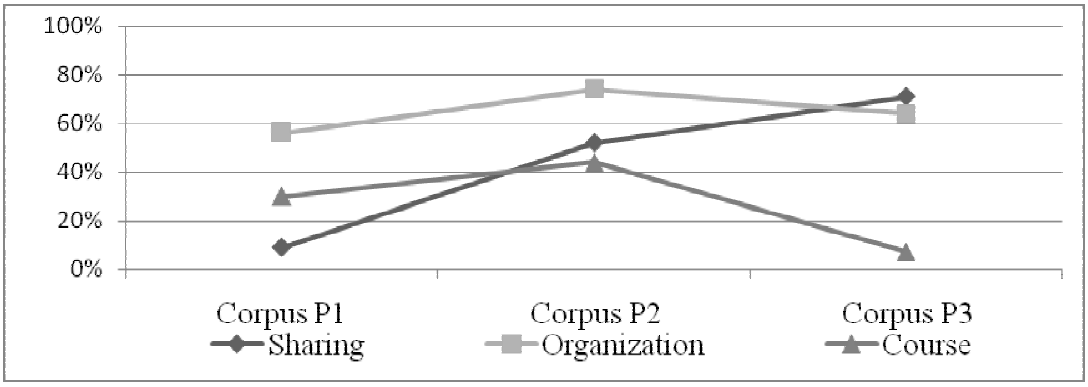

Figure 3: Characters contained in socio-cognitive

However the messages we have traced, made little reference to the course content as would be the case. On line communication which was not directly linked to the course content seems essential to promote cohesiveness and group existence.

DISCUSSION

The digitized traces of the actions of six students confirm the richness and the appearance of highly structured interactions. On the forum designed for online communication, students worked together. The structure of the forum acts on interactions, which themselves determines the social experiment conducted by the actions. This structure, steeped in technological aspects, influence people and their perceptions. Spaces dedicated to different groups of collaborative work are open to all students of the program. Despite this possibility, students outside the group did not intervene or very few (only 8 messages in this case). The content analysis of messages highlighted the significant number of references to areas other than the forums. They were then produced in the course module at the initiative of some students.

As part of online collaborative work, students were engaged in conducting a joint project since it was a matter of collective production with a specific deadline. Also in the case studied, there was a strong challenge since part of the collaborative work led to products involved in the final evaluation. Hence it can be considered that there must be a relationship of interdependence between group members. Each team member has the respect of the order of interaction (Goffman, 1988) by its partners, which implies a certain level of commitment, that is to say an emotional and intellectual attention to the official purpose of interaction (Winkin, 1981). They are linked by a common sense given the current situation and a form of intimacy was established in the team. A minimum participation seemed implicitly recognized by all as essential. Each shows a part of himself by the actions he commits and how it communicates. This part of self that was exposed at distance passed mainly through writing, contrary to what is observed in-face to face situation. Individual identity was circumstantial and made of different facets (Le Breton, 2004).

This approach allows the micro sociology to pay attention to what's playing at a small social unit in the specific context of online collaborative learning. In the field of human communication and thematic analysis the presence of strong socio-emotional and socio-cognitive factors is verified. The cognitive aspects are more prominent because of the context of interaction, a forum dedicated to a collaborative academic project. The actions of participants are constrained by the technical backbone of the forum, but also a form of *interactional order.* The social reality of collaborative working group observed is constantly reshaped by the actions of its members. The study of social dimensions in distance

education is as essentially linked with the teaching and learning are central as addressed in the socio-constructivist theories. The complexity of such research remains consistent (Henry, Peraya & Charlier, 2007) and involves leaving the usual frame of reference already heavily pushed by the digital revolution.

REFERENCES

Bardin, L. (2007). *L'analyse de contenu*. Paris : Quadrige PUF

Beziat, J., & Wallet, J. (2007). Entre dispositif de formation et pratiques sociales : L'étudiant à distance, Dans *Le campus numérique FORSE, analyses et témoignages*, Publication des universités de Rouen et du Havre.

Blanchet, A., Glione, R., Massonnat, J., & Trognon, A. (2000). *Les techniques d'enquête en sciences sociales*. Paris : Dunot.

Bruillard, E. (2005). Le forum de discussion, un cas d'école pour les recherches en EIAH, *Revue STICEF Sciences et Technologies de l'Information et de la Communication pour l'Éducation et la Formation.* Volume 15. Retrieved from http://sticef.univ- lemans.fr /num/vol2006/sticef_2006_ns_edito.htm (consulté le 2 février 2010).

Bruillard, E. (2008). Travail et apprentissage collaboratifs dans des formations universitaires de type hybride. Éléments de réflexion. *Revue Éducation- Formation- e-288*, Université de Mons-Hainaut. Retrieved from http://ute2.umh.ac.be/revues/index.php?revue=4& page=3.

Glikman, V. (2002). *Des cours par correspondance au "E-learning" Education et formation*. Paris : Presses Universitaires de France.

Goffman, E. (1973). *La mise en scène de la vie quotidienne, 1-La présentation de soi*. Paris: Le sens commun.

Goffman, E. (1988). *Les Moments et leurs Hommes*, textes réunis et présentés par Yves Winkin, Paris : Seuil/Minuit.

Henri, F., Peraya, D., & Charlier, B. (2007). La recherche sur les forums de discussion en milieu éducatif : Critères de qualité et qualité des pratiques. *Revue STICEF Sciences et Technologies de l'Information et de la Communication pour l'Éducation et la Formation*. Retrieved from http://sticef.univ-lemans.fr/num/vol2007/18-henri/sticef _2007_henri_18p.pdf

Jacquinot-Delaunay, G. (2001). Le "sentiment de présence". Actes des Deuxièmes Rencontres Réseaux Humains / Réseaux Technologiques. Poitiers, 24 juin 2000. *Documents, Actes et Rapports pour l'Education*, CNDP, pp. 183-191.

Le Breton, D. (2004). *L'interactionnisme symbolique*. Paris: Presses Universitaires de France.

Levy, P. (1997). Cyberculture. *Report to Council of Europe*. Paris: Editions Odile Jacob

Mangenot, F. (2008). Pratiques pédagogiques instrumentées et propriétés des outils : Le cas des forums. *Revue STICEF Sciences et Technologies de l´Information et de la Communication pour l´Éducation et la Formation*. Volume 15. Retrieved from http://sticef.univlemans.fr/num/vol2008/05mangenot/sticef_2008_mangenot_05.html.

Nizet, J., & Rigaux, N. (2005). *La sociologie de Erving Goffman*, Paris: Editions La Découverte.

Peirce, C.S. (2006). *OEuvre philosophiques – Tome 3, Ecrits logiques.* Paris: Cerf

Perret-Clermont, A. N. (1986). *La construction de l'intelligence dans l'interaction sociale.* Berne : Peter Lang.

Pradeau, A. (2009). *Des interactions sociales en formation universitaire à distance. Une approche microsociologique exploratoire et inférentielle*. Mémoire de Master1 en Sciences de l'Éducation Université de Lyon-Lyon2 (dirigé par Jean-Claude Régnier)

Queau, P. (2000). *La planète des esprits, Pour une politique du cyberespace*. Paris : Éditions Odile Jacob.

Simeone, A., Eneau, J., & Rinck, F. (2007). Scénario d'apprentissage collaboratif à distance et en ligne : des compétences relationnelles sollicitées ou développées? *International Journal of Information Sciences for Decision* Marketing n° 29.

Tholozan, O. (2004). Temporalité et contenu communicationnel d'un enseignement en ligne : l'exemple du DAEU à la MFC de l'Université d'Aix-Marseille III, *Informations, Savoirs, Décisions, Médiations, Journal International des Sciences de l'Information et de la Communication*, ISDM N°18. Retrieved from http://isdm.univ-tln.fr/PDF/isdm18/58-tholozan.pdf

Wallet, J. (2002). Le point de vue des sciences de l'éducation, *Actes du symposium Technologies informatiques en éducation : perspectives de recherches, problématiques et questions vives*, Paris MSH/INRP, 2002.

Wallet, J. (2007). *Le campus numérique FORSE, analyses et témoignages*, Publication des universités de Rouen et du Havre.

Weissberg, J. L. (2001). Entre présence et absence. *Actes des Deuxièmes Rencontres Réseaux Humains / Réseaux Technologiques*. Poitiers, 24 juin 2000. *Documents, Actes et Rapports pour l'Education*, CNDP, p. 31-39. Retrieved from http://edel.univ-poitiers.fr/rhrt/document.php?id=429

Winkin, Y. (1981). *La nouvelle communication*. Paris: Éditions du Seuil.

Winkin, Y. (2001). *Anthropologie de la communication. De la théorie au terrain*. Paris: Éditions De Boeck & Larcier S.A./Editions du Seuil.

Wolton, D. (2000). *Internet et après: Une théorie critique des nouveaux médias*. Paris : Flammarion.